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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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MYERS BIGEL SIBLEY & SAJOVEC
PO BOX 37428
RALEIGH, NC 27627

EXAMINER
MEHTA, ASHWIN D

ART UNIT	PAPER NUMBER
1638	

DATE MAILED: 07/30/2003

28

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/281,528	ROBERTSON, DOMINIQUE	
	Examiner	Art Unit	
	Ashwin Mehta	1638	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *31 March 2003* .

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1,2,4-6,11-16,21,32,38-58 and 62-65* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1,2,4-6,11-16,21,31,32,38-58 and 62-65* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *30 March 1999* is/are: a)☐ accepted or b)☒ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

11)☐ The proposed drawing correction filed on _____ is: a)☐ approved b)☐ disapproved by the Examiner.

If approved, corrected drawings are required in reply to this Office action.

12)☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

13)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____ .

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

14)☒ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).

a) ☐ The translation of the foreign language provisional application has been received.

15)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☒ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) *4,5,8* .
4) ☐ Interview Summary (PTO-413) Paper No(s). _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: .

DETAILED ACTION

Status of the Application

1. The Art Unit location of your application in the PTO has changed. To aid in correlating any papers for this application, all further correspondence regarding this application should be directed to Group Art Unit 1638. Further, the examination of the application has been transferred to Examiner Ashwin Mehta.

2. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 24 March 2003 has been entered.

3. The rejections of claims 1-6, 8, 9, 11-16, 18, 19, 21, 31, 32, and 35-65 under 35 U.S.C. 112, 1st paragraph, for lack of written description and scope of enablement, are withdrawn and replaced with the rejections below.

Drawings

4. INFORMATION ON HOW TO EFFECT DRAWING CHANGES- Applicants are required to submit corrected drawings in response to the attached Form PTO-948. Note that the information on how to effect drawing changes that appears on the reverse side of the PTO-948 has been **replaced** with the information below.

Correction of Informalities -- 37 CFR 1.85

New corrected drawings must be filed with the changes incorporated therein. Identifying indicia, if provided, should include the title of the invention, inventor's name, and application number, or docket number (if any) if an application number has not been assigned to the application. If this information is provided, it must be placed on the front of each sheet and centered within the top margin. If corrected drawings are required in a Notice of Allowability (PTOL-37), the new drawings **MUST** be filed within the **THREE MONTH** shortened statutory period set for reply in the "Notice of Allowability." Extensions of time may NOT be obtained under the provisions of 37 CFR 1.136 for filing the corrected drawings after the mailing of a Notice of Allowability. The drawings should be filed as a separate paper with a transmittal letter addressed to the Official Draftsperson.

Corrections other than Informalities Noted by Draftsperson on form PTO-948.

All changes to the drawings, other than informalities noted by the Draftsperson, **MUST** be made in the same manner as above except that, normally, a highlighted (preferably red ink) sketch of the changes to be incorporated into the new drawings **MUST** be approved by the examiner before the application will be allowed. No changes will be permitted to be made, other than correction of informalities, unless the examiner has approved the proposed changes.

Timing of Corrections

Applicant is required to submit acceptable corrected drawings within the time period set in the Office action. See 37 CFR 1.185(a). Failure to take corrective action within the set (or extended) period will result in **ABANDONMENT** of the application.

Double Patenting

The nonstatutory double patenting rejection is based on a judicially created doctrine grounded in public policy (a policy reflected in the statute) so as to prevent the unjustified or improper timewise extension of the "right to exclude" granted by a patent and to prevent possible harassment by multiple assignees. See *In re Goodman*, 11 F.3d 1046, 29 USPQ2d 2010 (Fed. Cir. 1993); *In re Longi*, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985); *In re Van Ornum*, 686 F.2d 937, 214 USPQ 761 (CCPA 1982); *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970);and, *In re Thorington*, 418 F.2d 528, 163 USPQ 644 (CCPA 1969).

A timely filed terminal disclaimer in compliance with 37 CFR 1.321(c) may be used to overcome an actual or provisional rejection based on a nonstatutory double patenting ground provided the conflicting application or patent is shown to be commonly owned with this application. See 37 CFR 1.130(b).

Effective January 1, 1994, a registered attorney or agent of record may sign a terminal disclaimer. A terminal disclaimer signed by the assignee must fully comply with 37 CFR 3.73(b).

5. Claims 1-41 and 58 are provisionally rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claims 1, 2, 5-13, 16, 17, 20-42, 44-56 of copending Application No. 09/876,360 ('360). Although the conflicting claims are not identical, they are not patentably distinct from each other because the claims of the instant application encompass the claimed products '360. The instant claims are drawn towards any geminivirus silencing vector comprising any geminivirus genome, comprising any geminivirus AL1, AL2, and AL3 coding sequences and heterologous DNA comprising at least a fragment of any gene that occurs naturally in any plant genome and vectors comprising any geminivirus genome containing heterologous DNA comprising at least a fragment of a coding region of any gene endogenous to any plant. The claimed invention of '360 is drawn towards a cabbage leaf curl virus (CbLCV, a geminivirus) silencing vector comprising a CbLCV genomic component comprising one or more heterologous DNA sequences having substantial similarity to any endogenous plant gene. As broadly interpreted, the genomic component of CbLCV vector comprises the CbLCV AL1, AL2, and AL3 coding sequences. It is noted that the instant application has an earlier effective filing date than '360. However, a terminal disclaimer is still required, to avoid the potential for harassment of an accused infringer by multiple parties with patents covering the same patentable invention.

This is a provisional obviousness-type double patenting rejection because the conflicting claims have not in fact been patented.

6. Claims 1, 3, 4, 6, 11, 31, 32, 38, 39, 50, 51, 54, 55, and 58 are provisionally rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claims 1, 2, 5, 13-16, 18-21, 23-31, 34, 36, 40, 41, 43-46, and 50 of copending Application No. 876,503 ('503). Although the conflicting claims are not identical, they are not patentably distinct from each other because the scope of the instant claims encompasses the scope of the claims of '503. The instant claims are drawn towards any geminivirus silencing vector comprising any geminivirus genome, comprising any geminivirus AL1, AL2, and AL3 coding sequences and heterologous DNA comprising at least a fragment of any gene that occurs naturally in any plant genome and vectors comprising any geminivirus genome containing heterologous DNA comprising at least a fragment of a coding region of any gene endogenous to any plant. The claims of the co-pending application encompass geminivirus silencing vectors comprising the B component of any geminivirus, wherein the B component comprises one or more heterologous DNA sequences encoding at least any fragment of any endogenous plant gene. The instant claims indicate that the vectors comprise a geminivirus genome. As bipartite geminiviruses are not excluded, the vectors of the instantly claimed invention can comprise the B component of bipartite geminiviruses. It is obvious that the heterologous DNA can include fragments of more than one endogenous gene. One would have been motivated to include fragments of more than one endogenous gene, in order to silence more than one gene upon introduction into a plant cell or plant. The instant claims also do not place any limitation on the location of the heterologous DNA in the vector. It is noted that the instant application has an earlier effective filing date than '503. However, a terminal disclaimer is still required, to avoid

the potential for harassment of an accused infringer by multiple parties with patents covering the same patentable invention.

This is a provisional obviousness-type double patenting rejection because the conflicting claims have not in fact been patented.

7. Claims 1, 2, 4-16, 21, 31, 32, 38-58, 62, and 63 are provisionally rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claims 1-8, 11, 12, 17, 18, 20-24, 27-29, 33-74, and 84-92 of copending Application No. 09/560,111 ('111). Although the conflicting claims are not identical, they are not patentably distinct from each other because the scope of the instant claims encompasses the scope of the claims of '111. The instant claims are drawn towards any geminivirus silencing vector comprising any geminivirus genome, comprising any geminivirus AL1, AL2, and AL3 coding sequences and heterologous DNA comprising at least a fragment of any gene that occurs naturally in any plant genome, and vectors comprising any geminivirus genome containing heterologous DNA comprising at least a fragment of a coding region of any gene endogenous to any plant. The claims of the co-pending application encompass geminivirus silencing vectors comprising any geminivirus genome comprising any geminivirus AL1, AL2, AL3, BR1, and BR2 coding sequences, and heterologous DNA comprising two or more nucleotide sequences, each comprising at least a fragment of any gene that occurs naturally in any plant genome. It is obvious that the heterologous DNA can include fragments of more than one endogenous gene. One would have been motivated to include fragments of more than one endogenous gene, in order to silence more than one gene upon introduction into a plant cell or plant. The instant

claims indicate that the vectors comprise a geminivirus genome. As bipartite geminiviruses are not excluded, the vectors of the instantly claimed invention can comprise the genes of the B component of bipartite geminiviruses. Both applications also contain claims that limit the geminivirus genome of the vectors to be from Tomato Golden Mosaic Virus and African Cassava Mosaic Virus. It is noted that the instant application has an earlier effective filing date than '111. However, a terminal disclaimer is still required, to avoid the potential for harassment of an accused infringer by multiple parties with patents covering the same patentable invention.

This is a provisional obviousness-type double patenting rejection because the conflicting claims have not in fact been patented.

Claim Rejections - 35 USC § 112

The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

8. Claims 1, 2, 4-6, 11-16, 21, 31, 32, 38-58, and 62-65 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

In claims 1, 12, 38, 40, 42, 44, 46, 48, 50, 52, 54, 56, 62, 64: the claims are drawn to a geminivirus silencing vector comprising a geminivirus genome, a DNA construct comprising a geminivirus genome, or methods comprising a geminivirus silencing vector comprising a geminivirus genome. The terms "vector" and a DNA construct denote a single molecule. However, geminiviruses have monopartite or bipartite genomes. It is not clear if claims 1, 12, 38, 40, 50, 52, 54, 56, and 64 encompass genomes of bipartite geminiviruses. Claims 42, 44, 46,

48, and 62 are indefinite, as they are limited to the genomes of specific bipartite geminiviruses, yet are directed to a single vector.

In claim 4: the recitation, "a promoter that is associated with said endogenous plant gene" renders the claim indefinite. It is not clear what is meant by the term "associated." The metes and bounds of the claim are unclear.

In claims 11, 21, and 58: the term "modifies" renders the claims indefinite. It is not exactly clear what is encompassed by this term. The metes and bounds of the claims are not clear.

The following is a quotation of the first paragraph of 35 U.S.C. 112:

> The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

9. Claims 1, 2, 4-6, 11-16, 21, 31, 32, 38-58, and 62-65 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention.

The claims are broadly drawn towards any geminivirus silencing vector comprising any geminivirus genome, comprising any geminivirus AL1, AL2, and AL3 coding sequences and heterologous DNA comprising at least a fragment of any gene that occurs naturally in any plant genome; or wherein said DNA replaces a segment the geminivirus coat protein coding sequence;

or wherein said heterologous DNA is operably associated with a promoter associated with said endogenous plant gene; or any DNA construct comprising any geminivirus genome, wherein the DNA encoding the geminivirus coat protein has been replaced in part or in total with heterologous DNA comprising at least a fragment of an endogenous plant gene that naturally occurs in any plant genome; or any geminivirus silencing vector comprising any geminivirus genome which contains any heterologous DNA, said heterologous DNA comprising at least a fragment of a coding region of any gene endogenous to any plant, wherein the heterologous DNA is inserted into the vector in antisense orientation; or a geminivirus silencing vector comprising an African Cassava Mosaic Virus (ACMV) genome, or a Tomato Golden Mosaic Virus (TGMV) genome; or a method of silencing the expression of any endogenous plant gene in a plant cell, comprising inoculating said plant cell with any geminivirus silencing vector.

The specification indicates that a vector based on the TGMV A genomic component was constructed in which the coding sequence of the coat protein gene (AR1) was replaced with a polylinker, while retaining the AR1 promoter and terminator sequences. The A genomic component also contains the AL1, AL2, and AL3 genes. A 786 bp fragment from the 5' end of the cDNA of the nucleotide-binding subunit of magnesium chelatase (su) from *Nicotiana tabacum* (su) gene was inserted into the vector in both orientations, producing TGMV::su5S (sense) and TGMV::su5A (antisense). Another construct, termed TGMV::su5F, was produced which contained a mutated su gene that was disrupted by creating a stop codon 104 bp from the initiator ATG. Another TGMV vector construct comprising a 403 bp fragment of the su gene, stopping 108 bp before the stop codon, was also constructed (TGMV::su3S). Plasmids containing a 623 bp fragment from the 5' end of the firefly luciferase gene in sense

(TGMV::luc5S) or antisense (TGMV::.uc5A) were also constructed. The plasmid constructs were inoculated into *Nicotiana benthamiana* plants, along with the TGMV B component (Example 1).

The specification on page 10 indicates that "endogenous gene" refers to any gene integrated into the chromosomal DNA of any plant genome, including those artificially introduced. As broadly interpreted, the vectors of the claimed invention can comprise any fragment of any gene from any source. However, the specification does not describe those fragments of all genes that can silence the expression of that gene in a plant. Voinnet (Trends in Genetics, 2001, Vol. 17, pages 449-459) teaches that 21-23 nt RNAs are produced from the targeted sequence to be silenced, during post-transcriptional gene silencing (page 451). The specification does not describe any fragments of any genes smaller than 21 nt that can be used with the claimed invention. The smallest fragment described by the specification that silenced its endogenous target was the 403 bp fragment of the magnesium chelatase subunit coding sequence. No fragment smaller than this is described by the specification as having the property of silencing the endogenous gene from which it came when used with the claimed vectors.

Claims 4 and 14 also recite, "promoters associated with said endogenous plant gene." However, as promoters of all genes have not been isolated, the specification does not describe all of the promoters encompassed by the claims. See Fiers vs. Sugarno, 25 USPQ 2d (CAFC 1993) at 1606, which states that "[a]n adequate written description of a DNA requires more than a mere statement that it is part of the invention and reference to a potential method for isolating it; what is required is a description of the DNA itself". Given the breadth of the claims encompassing any fragment from any part of all genes, and promoters of all genes; and lack of guidance as

discussed above, the specification fails to provide an adequate written description of the multitude of nucleotide sequences encompassed by the claims.

10. Claims 1, 2, 4-6, 11-16, 21, 31, 32, 38-58, 62-65 are rejected under 35 U.S.C. 112, first paragraph, because the specification, while being enabling for geminivirus silencing vectors comprising fragments that are at least 403 bp in size and from coding sequences, does not reasonably provide enablement for said vectors comprising fragments smaller than 403 bp, or fragments that are from untranscribed sequences, or for promoters from genes that have not been isolated. The specification does not enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention commensurate in scope with these claims.

The claims are broadly drawn towards any geminivirus silencing vector comprising any geminivirus genome, comprising any geminivirus AL1, AL2, and AL3 coding sequences and heterologous DNA comprising at least a fragment of any gene that occurs naturally in any plant genome; or wherein said DNA replaces a segment the geminivirus coat protein coding sequence; or wherein said heterologous DNA is operably associated with a promoter associated with said endogenous plant gene; or any DNA construct comprising any geminivirus genome, wherein the DNA encoding the geminivirus coat protein has been replaced in part or in total with heterologous DNA comprising at least a fragment of an endogenous plant gene that naturally occurs in any plant genome; or any geminivirus silencing vector comprising any geminivirus genome which contains any heterologous DNA, said heterologous DNA comprising at least a fragment of a coding region of any gene endogenous to any plant, wherein the heterologous

DNA is inserted into the vector in antisense orientation; or a geminivirus silencing vector comprising an African Cassava Mosaic Virus (ACMV) genome, or a Tomato Golden Mosaic Virus (TGMV) genome; or a method of silencing the expression of any endogenous plant gene in a plant cell, comprising inoculating said plant cell with any geminivirus silencing vector.

The specification teaches that the TGMV A based vectors, discussed above, were inoculated into *N. benthamiana* plants via particle bombardment, along with the TGMV B component. Leaves bombarded with TGMV::su5S produced discrete yellow spots after 3-5 days, whereas leaves bombarded with wild-type TGMV produced chlorotic spots after 5 days, followed by leaf curling and chlorosis. Variegation was produced by systemic infection. Newly emerging leaves showed large yellow-white or green sectors. A cross-section of TGMV::su5S infected plants showed that inoculated leaves had a uniform lack of chlorophyll, and areas lacking chlorophyll showed no evidence of necrosis or cell death. When TGMV::su5S was inoculated without TGMV-B, systemic variegation did not occur, by yellow spots were produced in the inoculated area (Example 3). The specification also teaches that there were no repeatable differences in variegation in plants inoculated with TGMV::su5S and TGMV ::su5F, and plants bombarded with TGMV::su5A and TGMV::su3S also produced similar variegation. The specification teaches that the TGMV::su constructs did not integrate into chromosomal DNA (Example 4). Transgenic *N. benthamiana* plants expressing luciferase were bombarded with the TGMV::luc constructs. Low levels of luciferase activity were found in plants infected with either construct. The amount of luc transcript was reduced in the bombarded plants (Example 6).

However, the specification does not teach all fragments of all genes that can be used with the claimed vectors and methods to silence expression of the gene in plants. As discussed above,

Voinnet teaches that 21-23 nt RNAs are produced from the target sequence to be silenced, during post-transcriptional gene silencing (page 451). The instant specification does not teach gene silencing using fragments smaller than 21 nt. The smallest fragment taught by the specification that silenced its endogenous target was the 403 bp fragment of the magnesium chelatase subunit coding sequence. No fragment smaller than this is taught by the specification as having the property of silencing the endogenous gene from which it came when used with the claimed vectors and methods. The specification also teaches that up to 800 bp of foreign DNA can be inserted into geminivirus vectors (page 2, lines 14-17).

Further, the claims also do not limit the region of the endogenous gene from which the fragment is derived. The specification does not enable the claimed vectors and methods with fragments that are from non-transcribed gene sequences. Atkinson et al. (Plant J., 1998, Vol. 15, pages 593-604) also teach silencing of a plant gene using a geminivirus-based episomal vector, and assert that genes expressed from episomes should not be subject to transcriptional gene silencing. Atkinson et al. teach that silencing of the chalcone synthase gene in petunia using a TYDV-based vector appears to occur by post-transcriptional gene silencing (page 593). The instant specification fails to teach silencing of any gene in any plant cell with a method comprising the use of any geminivirus vector comprising a sequence that is not present in the mRNA transcript of a gene. In the absence of further guidance, undue experimentation would be required by one skilled in the art to use non-transcribed sequences of genes in claimed vectors to cause silencing of any endogenous gene in a plant.

Furthermore, the claims encompass promoters that have yet to be isolated and reduced to practice. See Amgen Inc. v. Chugai Pharmaceutical Co. Ltd., 18 USPQ2d 1016 at 1021 and

1027, (Fed. Cir. 1991) at page 1021, where it is taught that a gene is not reduced to practice until the inventor can define it by "its physical or chemical properties" (e.g. a DNA sequence). Promoters of genes that have yet to be isolated are likewise not enabled. Given the breadth of the claims encompassing any fragment from any part of all genes, promoters of all genes, and geminivirus vectors in which heterologous DNA is inserted without replacing coat protein coding sequence, unpredictability of the art, and lack of guidance of the specification as discussed above, undue experimentation would be required by one skilled in the art to make and use the claimed invention.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

11. Claims 42 and 46 are rejected under 35 U.S.C. 102(b) as being anticipated by Hayes et al. (Nature, 1988, Vol. 334, pages 179-182).

The claims are broadly drawn towards a geminivirus silencing vector comprising a tomato golden mosaic virus genome which contains heterologous DNA, said heterologous DNA comprising at least a fragment of any gene endogenous to any plant, wherein said vector silences expression of the gene upon introduction into any plant cell; or a DNA construct comprising a TGMV genome, wherein the DNA encoding the TGMV coat protein has been replaced in part or total with heterologous DNA comprising at least a fragment of an endogenous plant gene.

The instant specification teaches that "endogenous gene" refers to any gene integrated into the chromosomal DNA of any plant genome, and include those that occur naturally in a plant genome, as well as those artificially introduced (page 10, lines 3-7). Any gene, including non-plant genes, which can be stably integrated into a plant genome can then be considered to be an endogenous gene, according to this definition.

Hayes et al. teach a vector for the introduction of nucleotide sequences into plant cells based on the TGMV genome A. Vectors were produced in which the AR1 coding sequence was replaced with a neomycin phosphotransferase (neo) coding sequence (pages 179-180). The property to silence neo expression in a transgenic plant cell whose genome contains the neo coding sequence, upon introduction into that plant cell, is inherent to the vector.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

12. Claims 1, 2, 4-6, 11-16, 21, 31, 32, 38-58, and 62-65 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hayes et al. (Nature, 1988, Vol. 334, pages 179-182) in combination Metzlaff et al. (Cell, 1997, vol. 88, pages 845-854), Theologis et al. (Plant Physiol., 1992, Vol. 100, pages 549-551), Meyer et al. (Gene, 1992, Vol. 110, pages 213-217), and Koes et al. (Plant Cell, Vol. 2, 1990, pages 379-392).

The claims are broadly drawn towards any geminivirus silencing vector comprising any geminivirus genome, comprising any geminivirus AL1, AL2, and AL3 coding sequences and heterologous DNA comprising at least a fragment of any gene that occurs naturally in any plant genome; or wherein said DNA replaces a segment the geminivirus coat protein coding sequence; or wherein said heterologous DNA is operably associated with a promoter associated with said endogenous plant gene; or any DNA construct comprising any geminivirus genome, wherein the DNA encoding the geminivirus coat protein has been replaced in part or in total with heterologous DNA comprising at least a fragment of an endogenous plant gene that naturally occurs in any plant genome; or any geminivirus silencing vector comprising any geminivirus genome which contains any heterologous DNA, said heterologous DNA comprising at least a fragment of a coding region of any gene endogenous to any plant, wherein the heterologous DNA is inserted into the vector in antisense orientation; or a geminivirus silencing vector comprising an African Cassava Mosaic Virus (ACMV) genome, or a Tomato Golden Mosaic Virus (TGMV) genome; or a method of silencing the expression of any endogenous plant gene in a plant cell, comprising inoculating said plant cell with any geminivirus silencing vector.

Hayes et al. teach a TGMV-based plant transformation vector, as discussed above. The vector comprises that AL1, AL2, and AL3 coding sequences, and the common region. Hayes et

al. also teach inoculating plants with a construct comprising TGMV DNA B, suggest some uses of the vector, including suppressing gene expression (pages 179-180, 182).

Hayes et al. do not teach a vector based on the ACMV genome, expression of a naturally occurring plant gene from the vector.

Metzlaff et al. teach co-suppression of chalcone synthase A (chsA) in transgenic plants transformed with the chsA coding sequence, resulting in loss of flower pigment (pages 845-847).

Theologis et al. teach delay in fruit ripening in transgenic tomato plants expressing antisense ACC synthase gene (pages 549-550).

Meyer et al. teach a plant transformation vector based on the ACMV genome (pages 215-217).

Koes et al. teach the chsA gene promoter (page 380).

It would have been obvious and within the scope of one of ordinary skill in the art at the time the invention was made to use the TGMV vector of Hayes et al. to transfer any DNA sequence into plant cells, including the chsA coding sequence of Metzlaff et al. or the antisense ACC synthase sequence of Theologis et al. It would have been obvious, based on the teachings of Metzlaff et al. and Theologis et al., that the expression of the endogenous chsA or ACC synthase gene in the genome of the plants would have been inhibited. Alternatively, one could also have used the ACMV vector of Meyer et al. to introduce the nucleotide sequences of interest into plant cells. One would have been motivated to use geminivirus-based vectors to introduce sequences into plant cells, given their advantages stressed by Hayes et al. One would have been motivated to cosuppress chsA, given that Metzlaff et al. teach that this causes a change in flower pigmentation, which would be of interest to the ornamental industry. One would have been

motivated to express the antisense sequence of ACC synthase in plants, given that Theologis et al. teach that this inhibits expression of the endogenous gene and leads to a delay in fruit ripening. It also would have been obvious to replace the geminivirus coat protein gene promoter in the geminivirus vector with any other desired promoter. For example, the chsA coding sequence in the geminivirus vector could have been operably linked to the chsA promoter taught by Koes et al. One would have replaced the coat protein gene promoter with another promoter, as Hayes et al. teach that the coat protein promoter could be replaced with any plant promoter. It was also obvious that the vectors could have been inoculated into any plant capable of supporting replication of the geminivirus vector, including *Nicotiana* plants.

13. No claim is allowed.

Contact Information

Any inquiry concerning this or earlier communications from the examiner should be directed to Ashwin Mehta, whose telephone number is 703-306-4540. The examiner can normally be reached on Mondays-Thursdays and alternate Fridays from 8:00 A.M to 5:30 P.M. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Amy Nelson, can be reached at 703-306-3218. The fax phone numbers for the organization where this application or proceeding is assigned are 703-305-3014 and 703-872-9306 for regular communications and 703-872-9307 for After Final communications. Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-308-0196.

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ASHWIN D. MEHTA, PH.D
PATENT EXAMINER